Generation of Regolith on 243 Ida

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Brecciated meteorites have long provided evidence of the production and retention of regoliths on asteroids. Galileo's flyby of 243 Ida may have shed light on the mechanism by which these samples were formed. For the large and evidently recent multikilometer impact basin Azzurra, located in the poorly imaged western hemisphere of Ida, ballistically deposited ejecta produced large scale color and albedo variations on the asteroid (Geissler et al., *Icarus*, 120, 1996). In this case at least, regolith was generated during a major impact event and retained on the asteroid despite its low gravitational acceleration. Because of the irregular shape and rapid (4.6 hr.) rotation of Ida, debris from the Azzurra impact was distributed nonuniformly across the surface of the asteroid, resulting in an uneven contribution to Ida's regolith. At least 17 major impact basins can be identified on Ida, with diameters ranging from 2 to 10 kilometers. Their combined total volume, assuming a depth/diameter ratio of 1/6, is $\sim$400 km^3, equivalent to a uniform layer of regolith $\sim$100 m thick if all the ejecta were retained. In order to calculate the distribution of Ida's regolith, we model the reaccretion of ejecta launched from each of these craters under the influence of Ida's exotic dynamical environment, following the procedure employed to study Azzurra. The resulting "regolith" on Ida is made up of two distinct components, depending on initial launch speed. Low speed ejecta, presumably derived from the coarsest debris fragments, impact in the immediate vicinity of the source craters after a time of flight which is short in comparison to the asteroid's rotation period. For this class of ejecta the predicted soil distribution is dominated by the location and size of the source craters and their asymmetric ejecta blankets. Ejecta launched at speeds comparable to the asteroid's average escape velocity contribute the second class of regolith, presumably derived from the finest-sized fraction of ejecta. These particles are launched with sufficient speed so that their times of flight exceed the asteroid's rotation period, and tend to be swept up onto rotational leading surfaces upon reimpact. The distribution of this high speed component depends primarily on the shape and rotation rate of Ida. Computer generated animations of ejecta reaccretion on Ida will be presented.

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